COMMERCIAL BEST PRACTICES AND THE DOD ACQUISITION PROCESS

James S. B. Chew

Continuous improvement continues to be the rallying point for Department of Defense (DoD) acquisition reform. The recent changes to the DoD 5000 show that the department is streamlining the acquisition process to meet the realities of the evolving "new world" threats. As dramatic as the changes have been, there is room for improvement. Here we compare the streamlined DoD acquisition process with the process used in the American automobile industry—which continually deals with an ever-evolving threat. We discuss the Chrysler Corporation product development process and identify the "best practices" in their product development process. These best practices can be applied to the DoD acquisition process.[1]

The basic tenets of the current Department of Defense (DoD) acquisition reform are "better, faster, cheaper." The acquisition reforms have resulted in a new DoD 5000 rule which dictates what should be performed during a major system acquisition, not how to perform one. Using the new 5000, the systems developed should be:

1. Better. A high-quality system must be designed and built right the first time.

2. Cheaper. The costs of developing, building, fielding, and maintaining the system are constrained more so than in the past.

3. Faster. The streamlined process reduces the amount of time required to acquire and properly field systems.

The idea of DoD acquisition reform is not new. Since the DoD 5000 was first issued in 1971, there have been nine revisions in an effort to streamline and fine tune the DoD acquisition process (Ferrara, 1996) Table 1 presents a summary of the revisions and changes to the DoD 5000 since it was issued.

Even with the latest significant acquisition reforms, there is room for improvement. By examining a commercial product development process, one can identify some "best practices" to further improve the DoD acquisition process.

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Commercial Acquisition Process

Market pressures have forced U.S. industries to change their product development (system acquisition) process to produce products in a "better, faster, cheaper" manner, or risk extinction. The American automobile industry is a good example because of the rapid change in threat (e.g., the rise of the Japanese automobile industry in the early 1980s). Chrysler Corporation, in particular, evolved unique responses to this threat. *Forbes* magazine named the corporation 1997 "Company of the Year" because of their response strategy (Flint, 1977).

Faced with the possibility of bankruptcy because their product was noncompetitive, Chrysler studied the Japanese automakers and developed their own product development process to significantly reduce the concept-to-production timeline. In addition to reducing the product development time from 60 to 30 months, the product requirements process was refined to ensure that the customer was "delighted" with the resulting product (Roush, 1996).

The Chrysler Product Development and DoD acquisition process timeline are compared in Figure 1. The similarities are surprising, with the one exception—their program time is 24 to 36 months versus DoD's 7 to 12 years.

Commercial "Best Practices": The Chrysler Model

Chrysler has launched about 30 new products since 1991 using the process shown in Figure 1 (Chrysler, 1995). Sales, market share, customer satisfaction, customer loyalty, corporate profits, and dealer profits have all significantly increased during that time. In fact, the Chrysler product development process is now being studied by Japanese and European automakers.

Key elements of this process allowed Chrysler to achieve its goals of offering world-class, leading-edge products in a timely, competitive manner. These "best practices" which follow, should be considered for inclusion into any future DoD acquisition reform initiatives.

Mr. Chew has 13 years of experience in rocket propulsion, space system and weapons technology development, and technology acquisition. He holds a B.S. degree in mechanical engineering from California State Polytechnic University, Pomona, and an M.S. degree in systems management from the University of Southern California. He is a graduate of the Defense Systems Management College Advanced Program Management Course 96-2. Chew received the 1991 Air Force Systems Command Science and Technology Achievement Award. Chew was a propulsion engineer at Boeing Aerospace, a senior propulsion engineer at SPARTA, and became Chief, Rocket Propulsion Technology, Plans and Programs Directorate, at the Air Force Phillips Laboratory (formerly the Air Force Rocket Propulsion Laboratory and Air Force Astronautics Laboratory). He was assigned to the Office of the Director, Defense Research and Engineering, as a staff specialist (conventional weapons), from 1994–96. He is currently program manager, Naval Air and Surface Weapons Technology, Office of Naval Research. In addition, he is a product marketing consultant for Chrysler's Dodge Division, and is an adjunct engineering professor at Antelope Valley College.

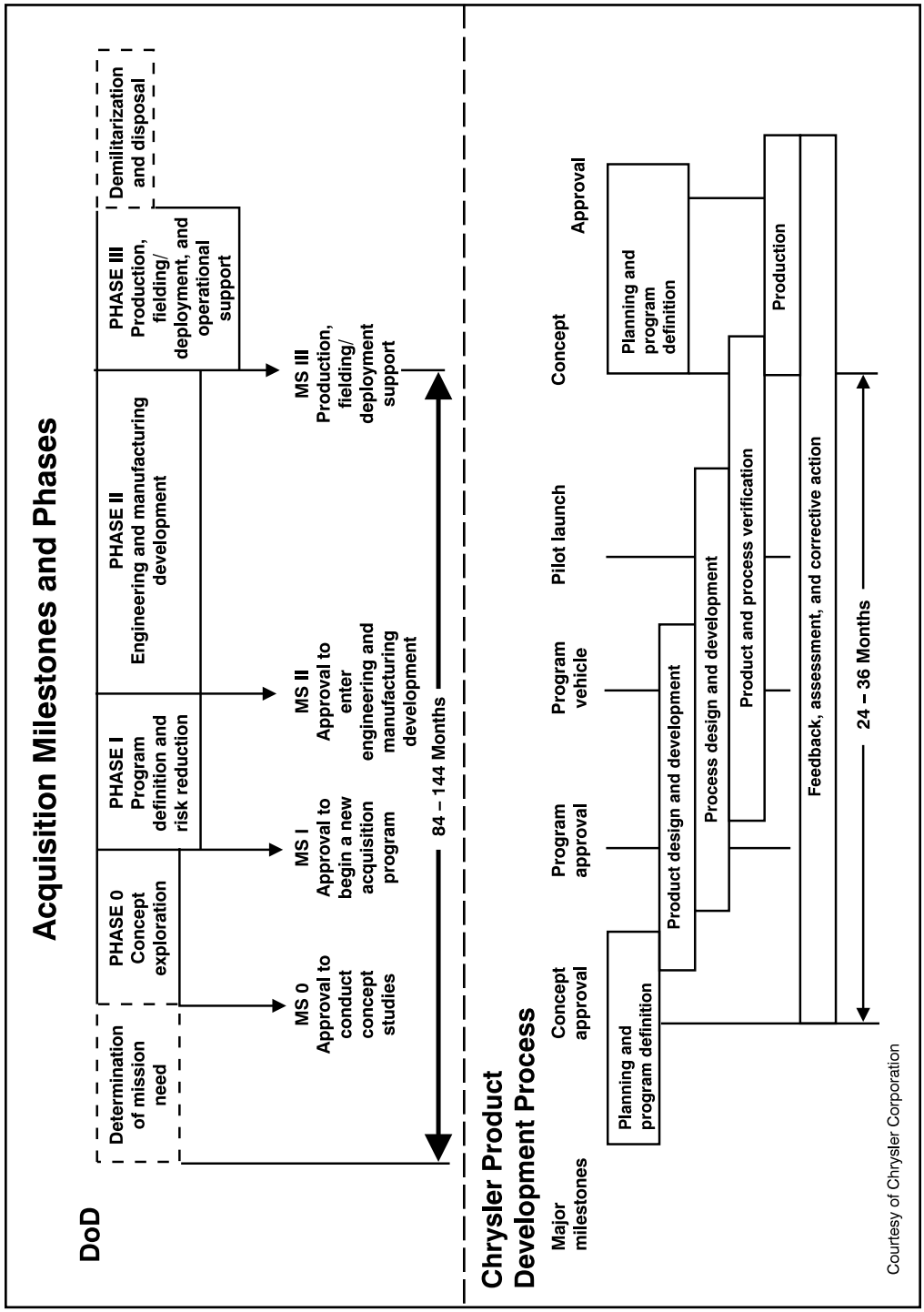

Figure 1. Comparison of DoD Acquisition Timeline to Chrysler Product Development Timeline

Continuous Improvement

Although the Chrysler product development process has been proven, the process is updated and refined with every new product, and thus incorporates the lessons learned from the previous development.

Requirements Benchmarking

The requirements for each new product are developed through aggressive benchmarking, performed both inside and outside of the company. In external benchmarking, prospective customers are surveyed to determine what they want in a certain product. This is performed through product clinics and focus groups: prospective customers are brought to a central location and surveyed about their likes, dislikes, and desires concerning certain competitive products. They are then shown several future product concepts to determine what features should be incorporated into it. The external benchmarking yields a rearview mirror perspective of system requirements. The customers can only tell the designer what they like based on the available choices.

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The internal benchmarking, on the other hand, is performed to provide the *vision* of what the future products should be. It is performed by the employees studying and testing the competition to determine the "best in class" attributes. Based on known customer desires, quality function deployment exercises to determine the key elements of customer desires, and monitoring of future automotive technology trends, management develops projections of what these attributes would most likely be by the time the developed product is launched as well as through the life cycle of that product. Through aggressive benchmarking and continued efforts to reduce product development cycle time, Chrylser is able to challenge yet achievable product requirements that make the developed product best in its class at launch and keep it competitive until a new model is fielded.

Cross-functional Platform Teams

Chrysler established product development "platform" (e.g., small car, large car, minivan, Jeep–truck) teams that incorporate all the disciplines necessary to develop a product, including engineering, manufacturing, sales, marketing, and finance. The platform team leader is given a product development budget, which cannot be exceeded. The team leader is allowed to shift costs when the team feels it is appropriate, but the product development schedule must be maintained. The platform team leader uses consensus techniques to make decisions with the understanding that once decisions are made, the entire platform team supports them. Past performance has shown that the cross-functional process, team member empowerment, and the desire for continuous improvement have reduced the development cycle time for each new product.

Independent, Aggressive Advanced Concept Development

To meet future product requirements and market conditions, Chrysler estab-

lished an independent advanced product development platform team that develops conceptual vehicles that meet time-phased technology goals five to ten years into the future. During the development of these advanced concept vehicles, the engineers and designers identify technologies, processes, and components that require development. The advanced concept engineers and designers write technical memorandums to the other platform development teams that outline (a) the technology, component, or process they have developed; (b) when it will be ready for incorporation into a production vehicle; (c) the competitive advantage of the technology, component, or process; and (d) techniques for incorporating that technology, process, or component.

This advanced concept development team, known as Chrysler Liberty, is located separate from the rest of the platform development teams. Customer reaction to these technologies and design concepts is gauged by showcasing advanced concept vehicles at the annual major auto shows (Moore, 1997).

Program Stability

At the concept approval phase, the corporate officers and the platform team leader agree to a "contract" in which the corporate officers approve a product development budget and schedule and the platform team leader agrees to produce, field, and establish the required logistics and operational support for a product that meets the established requirements. During product development, the budget remains stable and the product requirements are changed only if the competition surprises the platform development team. However, all changes are performed by the team. The corporate officers are briefed on the progress of the work.

Addressing Product Quality Upfront and Early

The automobile manufacturers and their supplier base are striving to work toward the ISO 9000 quality and reliability standard. However, ISO 9000 specifies what is expected of a quality system, not "how" to establish a quality system. Figure 2 presents the detailed tasks that dictate the how for the concept phase of the Chrysler product development process (Roush, 1996). This phase takes place *prior* to concept approval. Note the number of quality and reliability tasks that are performed during this phase. The number of quality and reliability tasks, including product serviceability and assembly, significantly increase with each product development phase. These quality and reliability tasks are required of Chryler's supplier base also (Lesniack, 1996). Suppliers are graded on their component quality and reliability; Chrysler does help suppliers that are having problems in these areas.

Because an assembly line shutdown for any reason costs the manufacturer approximately $3,000 a minute, it behooves both the manufacturer and the supplier to ensure that quality components are delivered to that line on time. Chrysler has found that "design for manufacturing" issues, such as design of experiments to identify the manufacturing variables and manufacturing lessons learned from previous products, must be identified and addressed during the concept development phase. This avoids the use of components or assembly procedures that require unique processes. Not only does this help

ensure high product and component quality, but ultimately lowers the cost of product development by eliminating costly redesigns and manufacturing processes. By addressing quality and reliability *aggressively and early* in product development, the need for material review boards to address noncompliant component issues are significantly reduced.

Applying Commercial "Best Practices" To DoD Acquisition

Applying some or all of these commercial best practices to the DoD acquisition process would decrease the acquisition costs and timeline as well as significantly improve the quality and reliability of the delivered system. But, each of these practices has an impact; we will now discuss some of them.

Continuous Improvement

The basis for following the Chrysler product development continuous improvement philosophy is the establishment of a process baseline. This baseline should identify and discuss in detail the significant tasks that must be performed during each phase. The expected "deliverables" for each milestone should also be identified and discussed. The tasks and deliverables may be modified, eliminated, or added as a result of "lessons learned." Using such a manual, with lessons learned from previous programs incorporated, program managers for new acquisition category (ACAT 1) programs, such as the Joint Air-to-Surface Standoff Missile (JASSM), the Joint Strike Fighter (JSF), the Evolved Expendable Launch Vehicle (EELV), and the Surface Combatant-21 (SC-21), would develop an initial program acquisition flowchart, with detailed tasks. The government–industry team would modify or revise them as the programs progress though Milestone III, and the charts would become the basis for an ACAT 1 program acquisition manual. Subsequent ACAT 1 programs would modify the manual as their "lessons learned" accrued.

"Too often in the past, coordination with the science and technology community did not occur until well after Milestone 0."

Requirements Benchmarking

The two major parties that need to work closely with the weapons designers during the requirements benchmarking process are the product customer (i.e. the warfighter, which includes the operations, maintenance, and logistics communities, and major operational commands) and the DoD science and technology community. The product customer helps the designer identify the deficiencies with the current systems and the needs that they would like a new system to fulfill. The DoD science and technology community, through a focused, time-phased, goal-oriented program, helps the designer identify the level of technology that will be available for the proposed new system. By combining the customer comments and the science and technology available, prototype systems on either the component, subcomponent, or "virtual" level would be developed and used for customer product "clinics." The weapons designer would use the data and information from both groups and the clin-

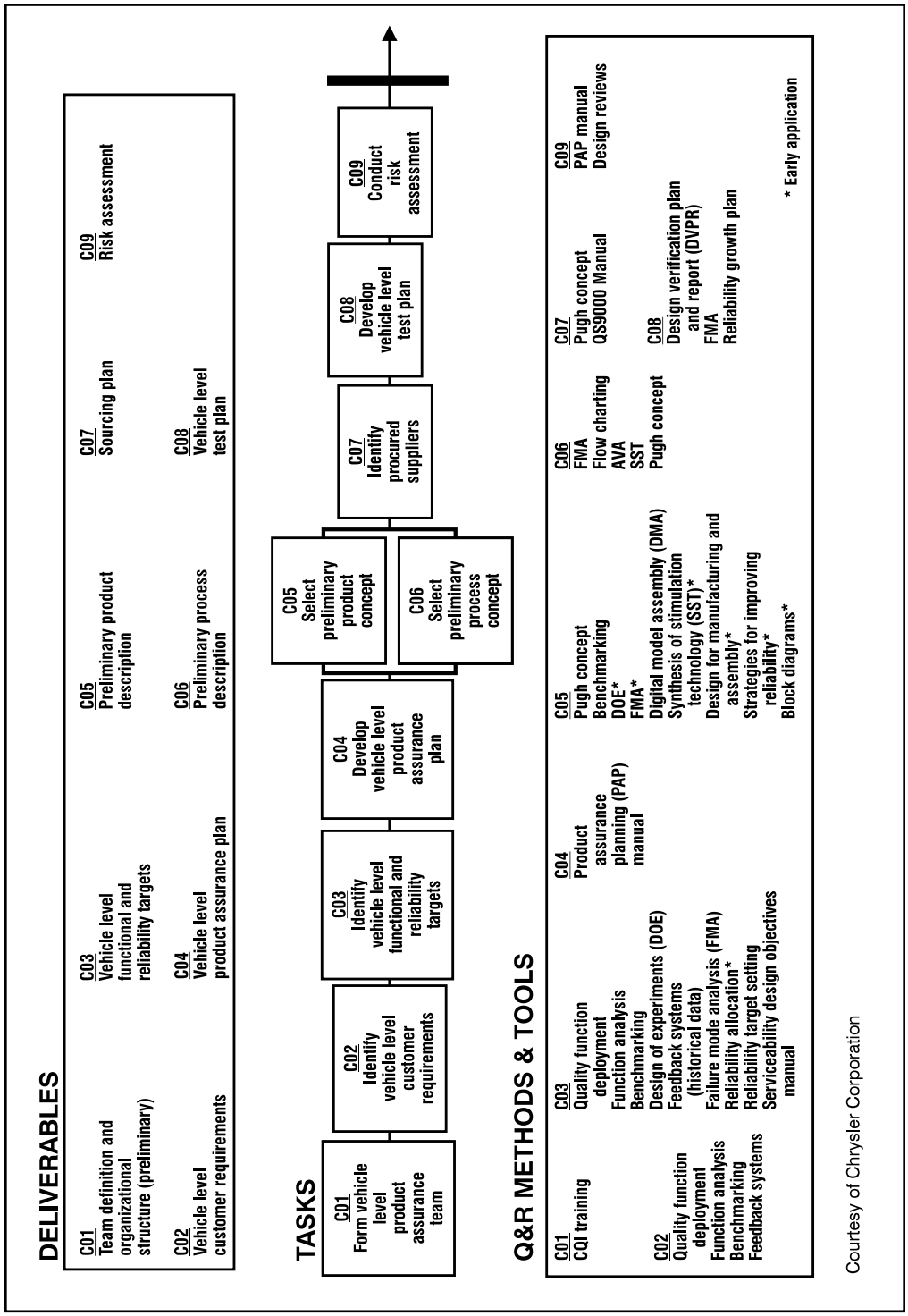

Figure 2. Product Assurance Planning: Concept Phase

ics to project what requirements the new system would need in order to be a "benchmark" system when fielded, and continue to be extremely competitive through its life cycle. Once these system requirements are set, they should not be changed or modified during the program acquisition. This step needs to be performed prior to Milestone 0. Too often in the past, coordination with the science and technology community did not occur until well after Milestone 0.

Cross-functional Platform Teams

As is the Integrated Product Team (IPT), the cross-functional platform team would be developed "upfront and early" in the program (prior to Milestone 0). As with Chrysler, the relevant industrial base would be brought in to provide a realistic determination of technology readiness and costs. These teams would be responsible for either developing or modifying their program acquisition flowchart and manual.

Independent, Aggressive Advanced Concept Development

To provide focus for the DoD science and technology community and provide ideas for future weapon systems designers and customers, more advanced concept demonstrations would need to be conducted as part of the DoD science and technology program. In addition to providing *focus* to the DoD labs and the industrial base, these hardware demonstrations provide a mechanism to address quality and reliability issues of incorporating the new technology "upfront and early," and provide an opportunity for the weapons designer to address technology transition and integration issues.

The DoD science and technology program would become even more efficient through these technology demonstrations, providing the program had time-phased technology goals that would be used consistently for these demonstrations. Existing DoD science and technology projects such as the Integrated High Performance Turbine Engine Technology (IHPTET) program and the Integrated High Payoff Rocket Propulsion Technology (IHPRPT) program have already developed time-phased technology goals, which will be demonstrated to help provide the weapons designer with propulsion system design options for future systems.

Program Stability

Program stability requires both requirements stability, which should be addressed through aggressive requirements benchmarking, and resource allocation process reform (Planning, Programming, Budget, Scheduling and Congressional Budget enactment) (Moore, 1997). The focus of this reform effort would be to *not* require annual acquisition program justifications, and to provide the acquisition program manager with the entire required program budget at Milestone 1 and allow the program manager to manage that budget through the course of that program. Concepts such as two-year appropriations and multi-year procurement would help provide program stability. The ability to commit future Congressional appropriations as well as trust in the acquisition program manager is necessary to provide the necessary program stability.

Addressing Product Quality Up-front and Early

Most of the DoD ACAT 1 programs are addressing the "cost of quality" issue (Lesniack, 1996). The cost savings projected by some of these programs, the Evolved Expendable Launch Vehicle (EELV) in particular, are from significant reductions in the cost of quality. The EELV program is using a "no-MRB" (Materials Review Board) strategy, which puts the quality burden primarily on the contractor. This implies applying the various quality design techniques during the *concept exploration phase,* which requires more funding at the beginning of the program. The acquisition program does not require more funding overall, just more up front. In fact, the Japanese have shown that applying more funding at the beginning of a product development program can actually reduce program costs and schedule. This is very much in keeping with the maxim, "an ounce of prevention is worth a pound of cure." The major impact is that instead of funding several small system development concept contracts with "seed money," the DoD and industry will need to do more work together, through contractual vehicles, to include more manufacturing and technology risk reduction during Phase 0. This will be most effective when combined with aggressive requirements benchmarking and program stability.

Summary

It should be noted that these "best practices" used by the Chrysler Corporation were developed as a result of the Chrysler Corporate Officers realization that the way they were conducting business would result in their bankruptcy. A corporate culture to "reinvent" the company to be the best automaker in the world was "brought in" by the entire company, and the product development process they now use is a result of this effort. By using their process, Chrysler has not only reduced their product development time from 60 to 24 months, but they have significantly reduced product development costs. Key to this transition was the willingness of the company to experience short term setbacks during the "re-invention period" for the significant long term gains.

The DoD is in a similar situation—the way we are doing business does not fit with the new world realities. While the current DoD Acquisition Reforms have been applauded by industry leaders, there is an acknowledgment that they do not go far enough (Augustine, 1996). Shorter system development cycle times, aggressive future system benchmarking initiatives, and focused, aggressive advanced concept development efforts are practices which would serve to keep DoD systems and the industrial base on the "leading edge." Although applying the aforementioned commerical "best practices" may not be "the" acquisition reform answer that many in the defense industry desire, it will go a long way toward meeting that goal.

YEAR	MAJOR CHANGES	REASONS	MAJOR MILESTONE	FORMAL MILESTONE DOCUMENT
1971		• Demonstrating to Congress a credible management system • Responding to Vietnam era drawdown	• Program initiation • Full-scale development • Production and deployment	• Decision coordination paper (DCP)
1975	• Minimal changes to 5000.1 • Included references to 19 DoDDs and DoDIs	• New administration • Issuance on new DoDI 5000.2	• Program initiation • Full-scale development • Production and deployment	• DCP
1977	• DSARC charter included in 5000.2 • Both documents issued as DoDDs • Added dem/val milestone • Directed establishment of service • Added definitions section	• Implement OMTBV A-109	• Program initiation • Full-scale development • Production and deployment	• Mission element need statement (MENS—for MISO) • DCP
1980	• Separate discussion of affordability, acquisition time, and tailoring • Added new milestone documentation and included administrative details such as a pre-DSARC countdown • Called out "Secretary of Defense decision memorandum" as official document	• Change of administration • Emphasize need to reduce cycle time and to correlate acquisition decision with PPBs	• Program Initiation • Demo/Eval • Full Scale Development • Production & Development	• MENS • DCP • Integrated program summary

Table 1. The 500 Series Historical Perspective

YEAR	MAJOR CHANGES	REASONS	MAJOR MILESTONE	FORMAL MILESTONE DOCUMENT
1982	• More explicit language on program stability, Economic production rates, and evolutionary acquisition strategies • Justification for major systems new starts replaces MENS	• Change of administration • Implement Carlucci initiatives and Defense Acquisition Improvement Program	• Program initation • Dem Val • Full-scale development • Production and deployment (delegated to components)	• JMSNS • System concept paper (SCP) • Test and evaluation master plan • DCP • IPS
1985	• Named Deputy Secretary as "Defense Acquisition Executive" • Reflected new ASD (Acquisition and Logistics) as Milestone III DSARC chair	• Demonstrate that top officials were paying attention to acquisiiton system • Respond to procurement horror stories	• Same as 1982	• Same as 1982
1986	• Includes discussion of DOT&E as member of DSARC • Includes discussion of content and timing of the beyond low rate initial production reports (B-LRIP)	• Reflect establishment of new Director of Operations Test and Evaluation (DOT&E) and associated reporting requirements	• Same as 1982	• Same as 1982 plus the B-LRIP report

Table 1. The 500 Series Historical Perspective (continued)

YEAR	MAJOR CHANGES	REASONS	MAJOR MILESTONE	FORMAL MILESTONE DOCUMENT
1987	• Includes discussion of USD(A) • Breaks major programs into two categories: DAB and component Includes discussion of program baseline	• Implement Packard Commission and related acquisition improvement legislation • Reflect establishment of new Under Secretary of Defense for Acquisition • Emphasize that 5000 acquisition policies apply department-wide	• Milestone 0, Concept Exploration and Definition • Milestone I, Demonstration and Validation • Milestone II, Full Scale Development/Low Rate Initial Production • Milestone III, Full Rate Production and Initial Deployment • Milestone IV, Review Readiness and Support • Milestone V, Upgrade or Other Replacement Action	• Mission Need Statement • Cooperative Opportunities Document • System Concept Paper • Test and Evaluation Master Plan • Cost and Operation Effectiveness Analysis • Common-Use Alternatives Statement • Program Baseline • Independent Cost Estimate • Decision Coordinating Paper • Acquisition Strategy Report • Beyond-LRIP Report • Manpower Estimate Report
1991	• Consolidation of more than 50 directives, instructions, and policy memoranda into a unified set of acquisition guidance • Application of 5000.2 procedures to all acquisition category programs • Creation of a manual specifying detailed formats and procedures for acquisition reports	• Change of administration • Implement Defense Management Report	Same as 1987 except for deletion of Milestone V	Same as 1987 except for: • Several documents formerly treated in separate regulations, such as Operational Requirements Document and System Threat Assessment Report, were now discussed in the new 5000.2-M manual • The SCP, DCP, and common-use alternatives statement were deleted

Table 1. The 500 Series Historical Perspective (continued)

YEAR	MAJOR CHANGES	REASONS	MAJOR MILESTONE	FORMAL MILESTONE DOCUMENT
1996	• Deletion of substantial volume of guidance formerly treated as mandatory • New guiding principles on non-traditional acquisition, IPPD, and innovative practices • Institutionalization of IPTs and IPPD • Deletion of numerous report formats	• Institutionalize reform efforts • Implement reinventing government initiatives • Integrate policy for weapon systems and automated information systems	Same as 1987 except for: • Deletion of Milestone V • Treatment of LRIP as a separate decision point that may be held after the Milestone II decision	Same as 1991 with the following changes: • Mandatory formats only specified for CARFS, ORD, TEMP, LFT&E, MAID quarterly report

Table 1. The 500 Series Historical Perspective (continued)

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